1.1 CCAMLR issues & AERD's concept of FBM

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Southwest Fisheries Science Center
Antarctic Ecosystem Research Division

TOR QUESTIONS: 1, 2, 7, 8

Outline

- AERD, U.S. AMLR, and CCAMLR
- Feedback management (FBM)

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AERD = Antarctic Ecosystem Research Division
U.S. AMLR = U.S. Antarctic Marine Living Resources Program
CCAMLR = Commission for the Conservation of Antarctic Marine Living Resources

Vision statement

"The AERD will provide scientific evidence needed to advance U.S. policy objectives in the Antarctic and implement precautionary, ecosystem-based management of living marine resources in the Southern Ocean. The Division will improve knowledge about the structure, function, and dynamics of the Antarctic marine ecosystem by observing the ecosystem, interpreting observed changes within the context of fishing and climate change, and predicting the potential impacts of fishing and climate change in the future."

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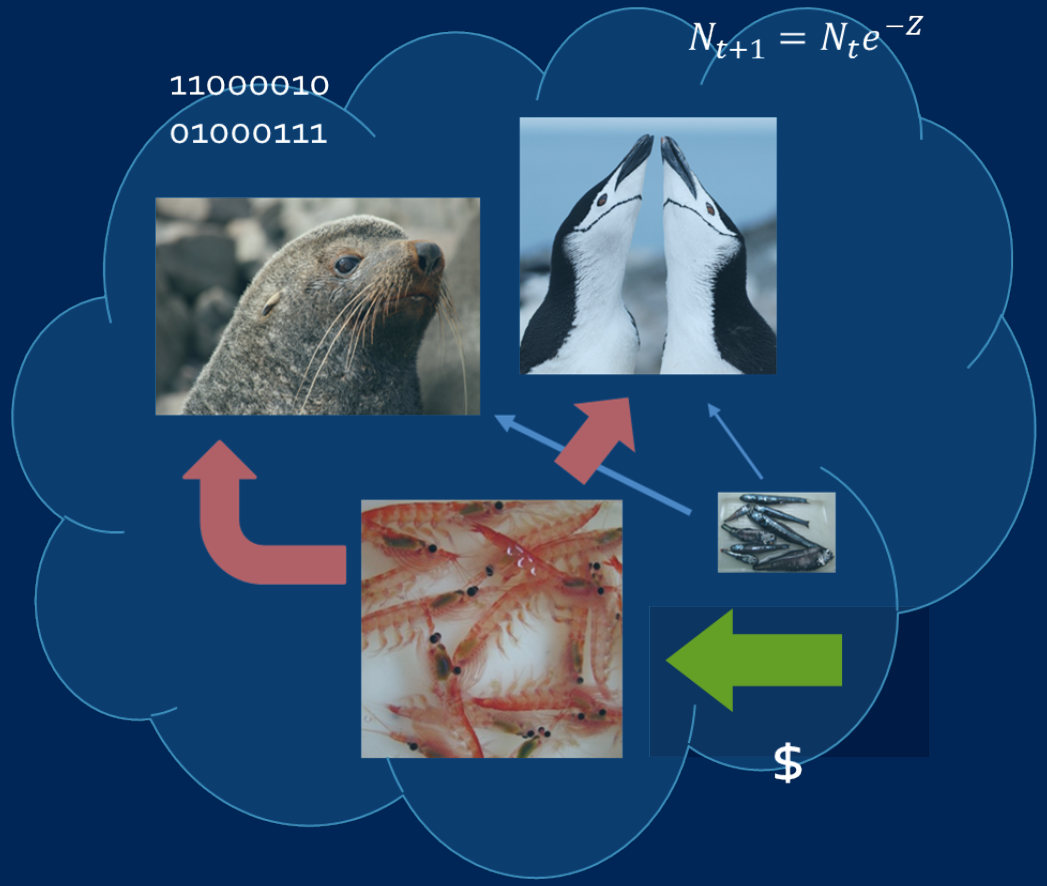
AERD staffing and funding



- 14 Federal employees
- 19 seasonal contractors, students, and post-docs
- $4.1 M in FY16
  - ~ 7% of SWFSC budget
  - flat budget with increasing costs

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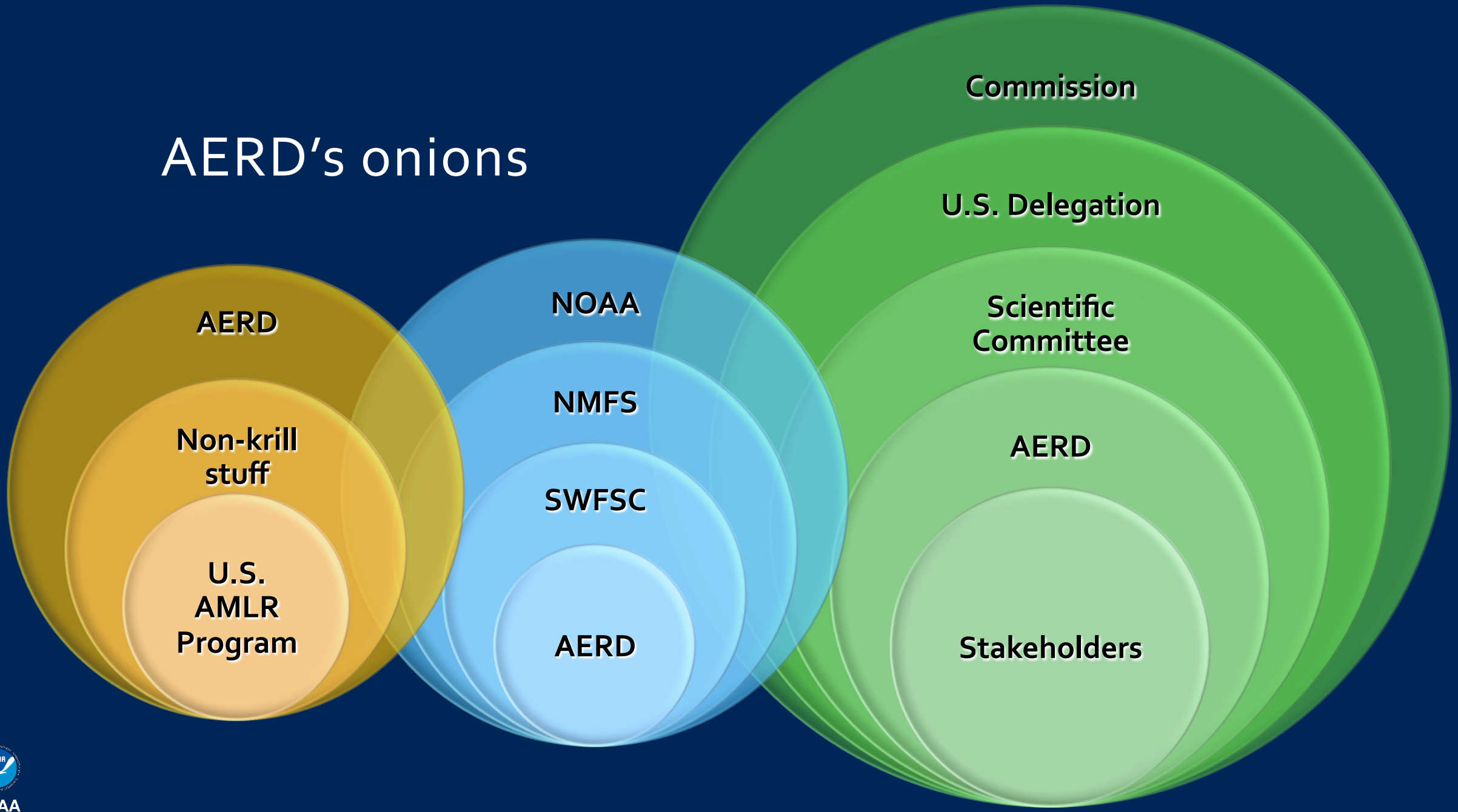
AERD's onions



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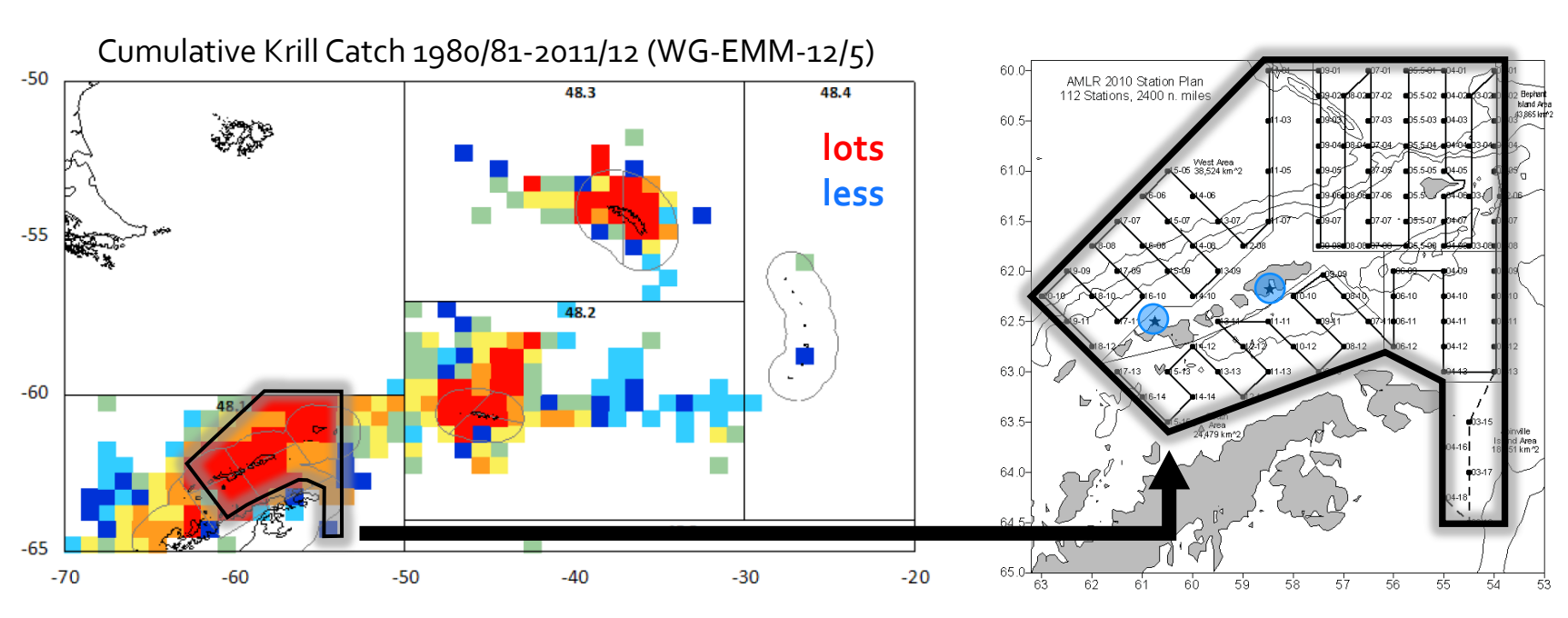
U.S. AMLR Program



- Ecosystem research and monitoring in major krill fishing area
- Surveys at sea (krill, birds, mammals, fishes, invertebrates, and oceanography)
- Two field camps (five seabirds and four pinnipeds)

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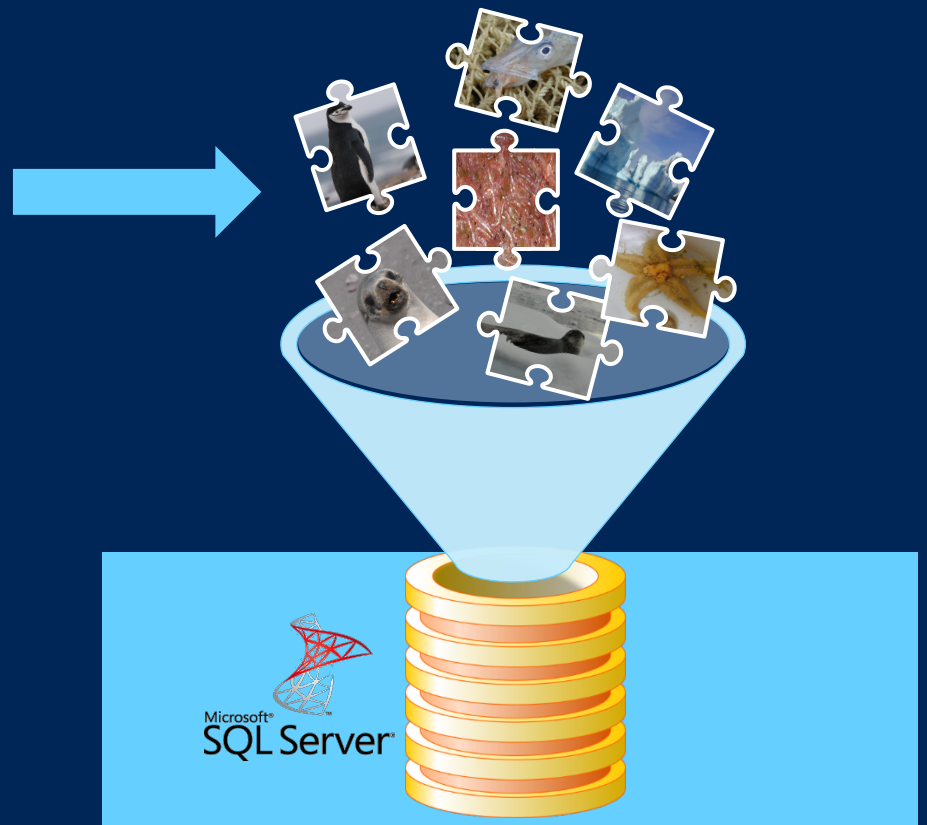
AMLR data

- 25+ years at sea
  - standard net and CTD stations
  - standard acoustic and underway oceanographic transects
  - process studies
- 30+ years on land
  - standard CEMP indices
  - other indices of predator performance
  - process studies
- 396 species from 221 genera
- multiple technologies



Integrated, relational database:

- designing tables and relationships
- developing views, queries, and reports
- facilitating QA/QC
- distributing architecture to other nations

- Publicly accessible and useful data products
- Analysis
- Synthesis
- Advice

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CEMP = CCAMLR Ecosystem Monitoring Program

2009 Review

Panel Recommendation	Outcome(s)
AMLR needs a vision	See Slide 3 above and our suite of presentations
Develop plan for sustained access to R/Vs	Ver. 3 = summer cruises 2 out of 3 yrs starting Jan 2018
Make data available	Some on web, more on way, data manager and management
Increase peer-reviewed publications	We are trying
Develop integrated stock assessment	See Presentation 1.4
Advance science of MPAs	See Presentation 1.7
Sustain grad students and post-docs	7 grad students and 2 post-docs since 2009
Get involved with IPCC AR5	Not done
Hire oceanographer, fish biologist, & logistics	Not done (probably not doable)
Broaden engagement with scientific community	Halting progress (e.g., SOOS, SCAR)

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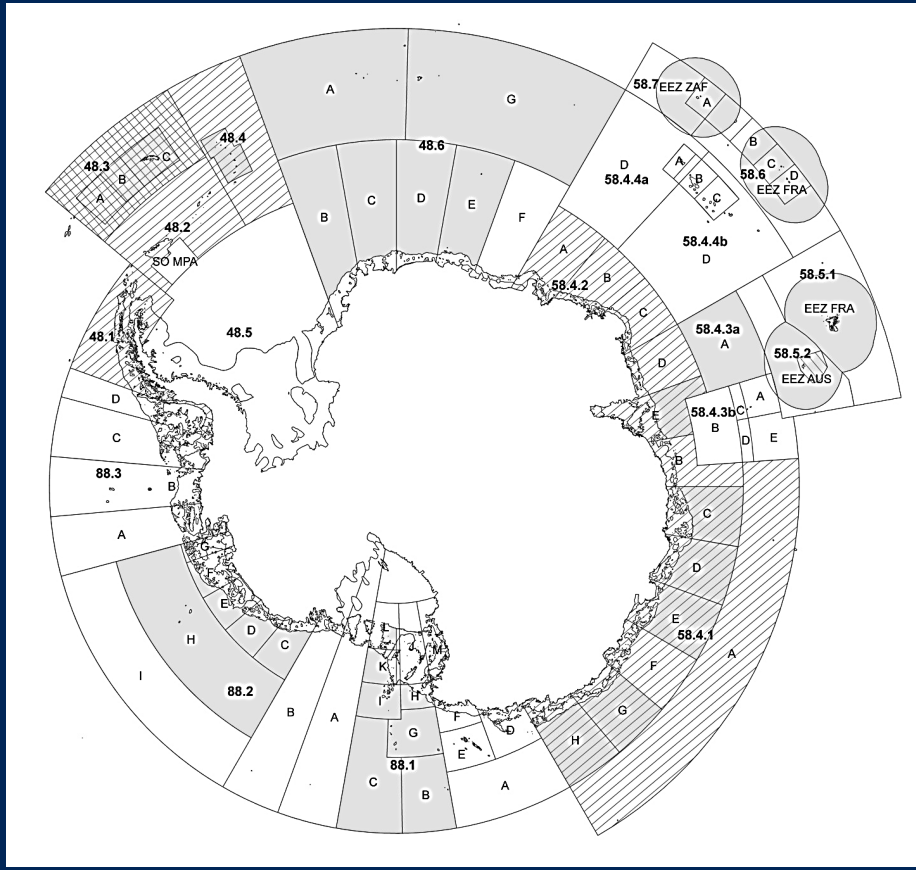
CCAMLR issues requiring scientific advice



- Forage fish (krill) management
- Marine protected areas (MPAs)
- Toothfish (Chilean seabass) fisheries
- Recovery of overfished stocks
- Incidental mortality and bycatch
- Protection of benthic communities
- Compliance and Illegal, Unreported, and Unregulated fishing

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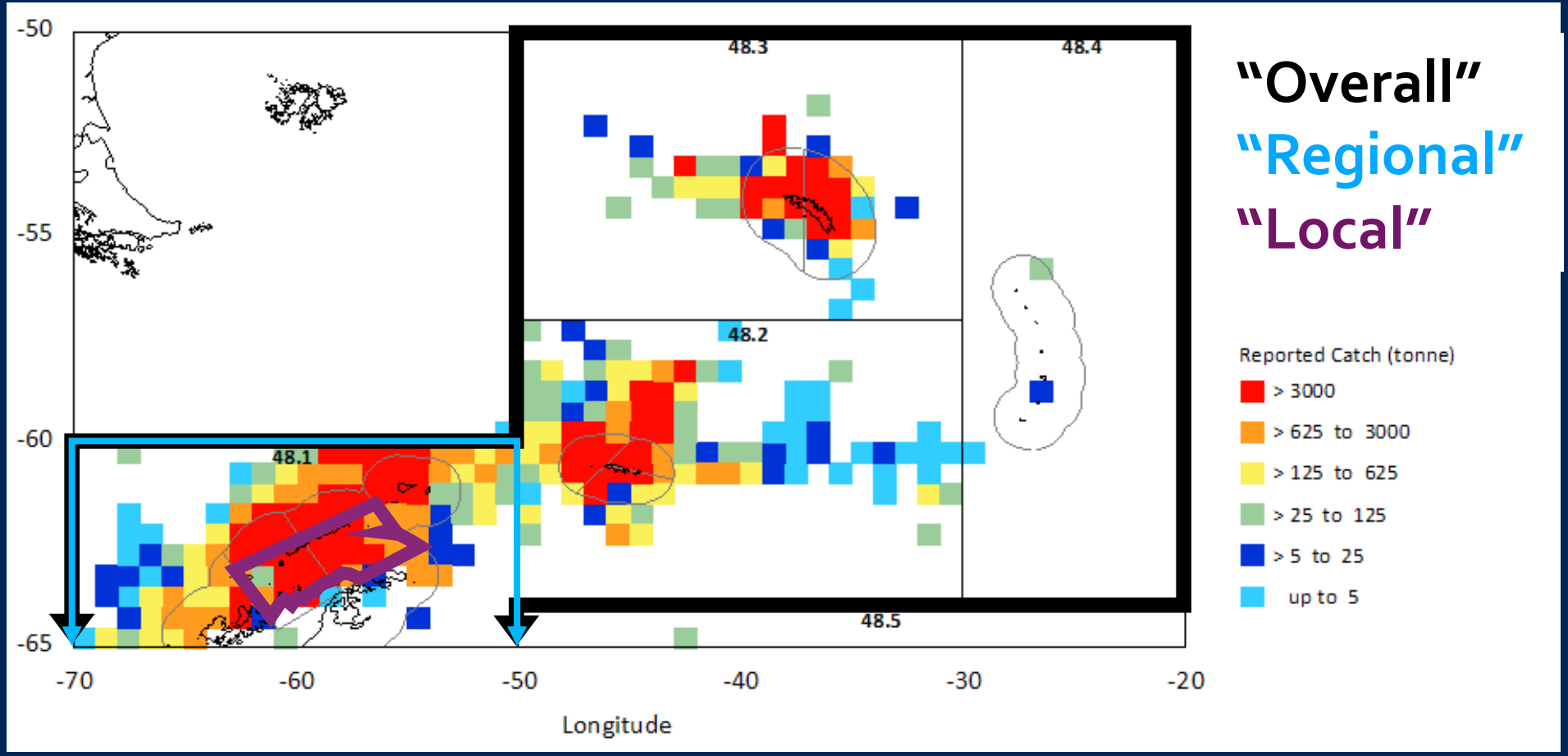
Feedback management (FBM)

Definitions of scale

Cumulative Krill Catch 1980/81-2011/12 (WG-EMM-12/5)



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Current management of the krill fishery

FACTS

- Overall catch limit = 5.61 Mt
- Catch ≤ 620 kt until overall limit is subdivided among "small scale management units" (SSMUs)
- Interim catch limits for Antarctic Peninsula (155 kt), South Orkney Is., South Sandwich Is., and South Georgia – all bigger than SSMUs

ISSUES

- Overall catch limit based on old data and problematic reference point
- Catch > 620 kt is risky to krill predators unless spatially managed
- Interim catch limits expire 30 Nov 2016 and may not be renewed

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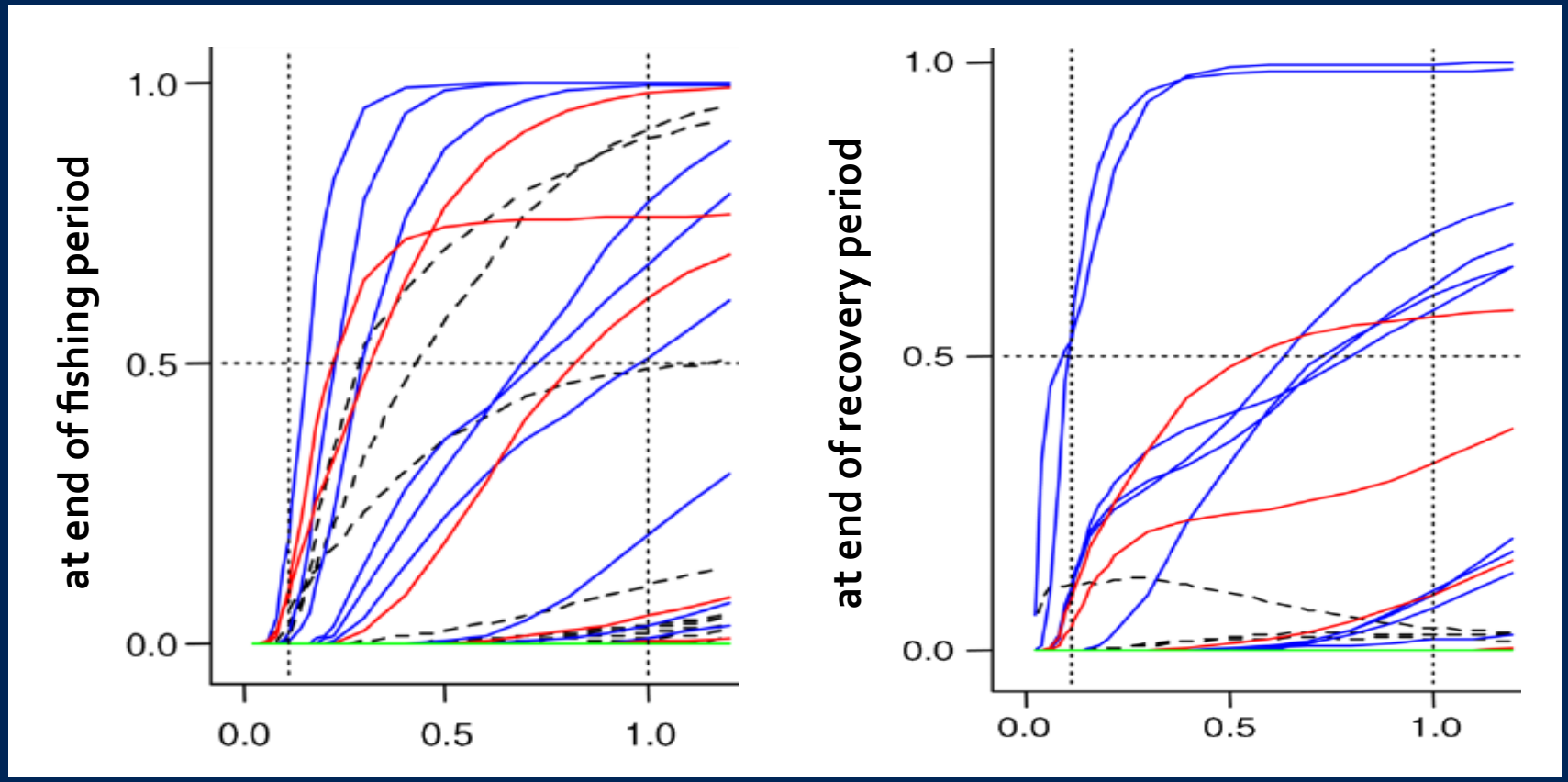
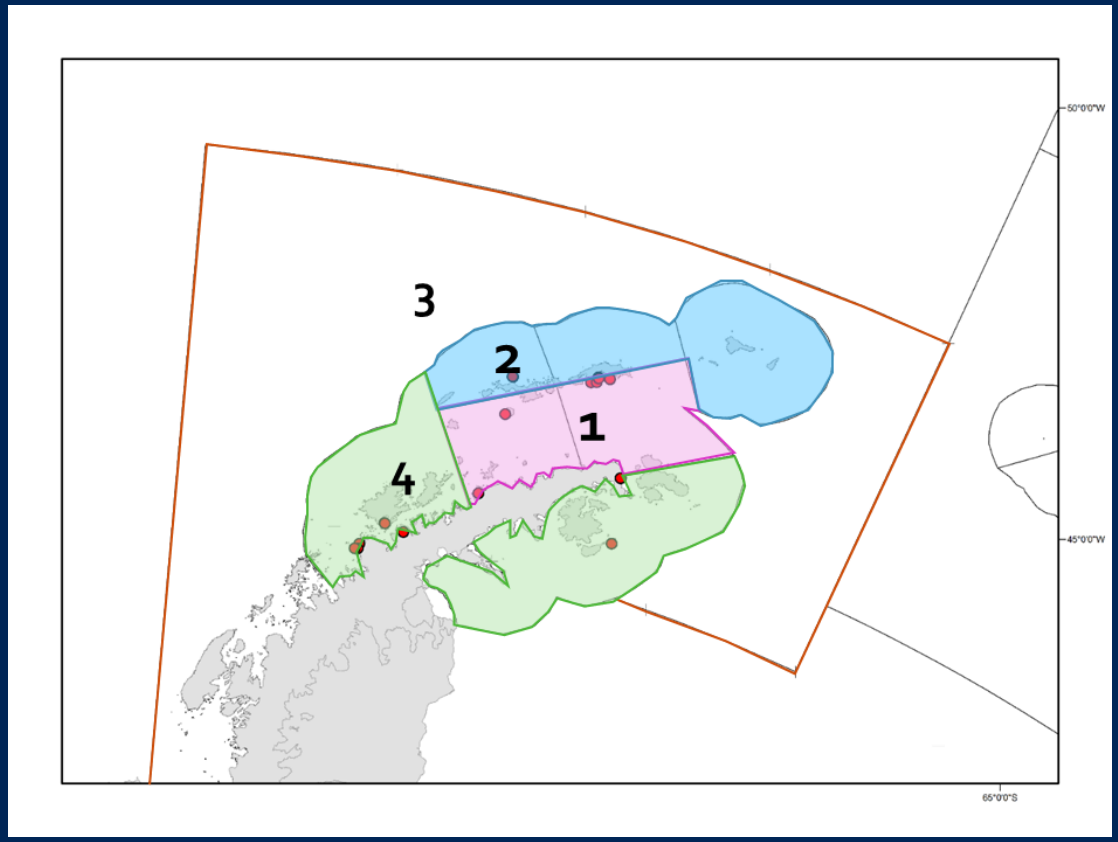
Risks of no spatial management



Adapted from Watters et al. (2013)

Local areas (groups of SSMUs)

1. Retentive, high overlap, lots of monitoring
2. Retentive, high overlap, limited monitoring
3. Low overlap, very limited monitoring
4. Low overlap, lots of monitoring – possible reference area*



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AERD's FBM concept

1. Establish regional catch limit to achieve a desirable, probabilistic, long-term outcome
2. Subdivide regional catch limit among local areas to manage risks
3. Use ecosystem observations to adjust catch limits in local areas
   - catch more krill in "good" years
   - catch less krill in "bad" years

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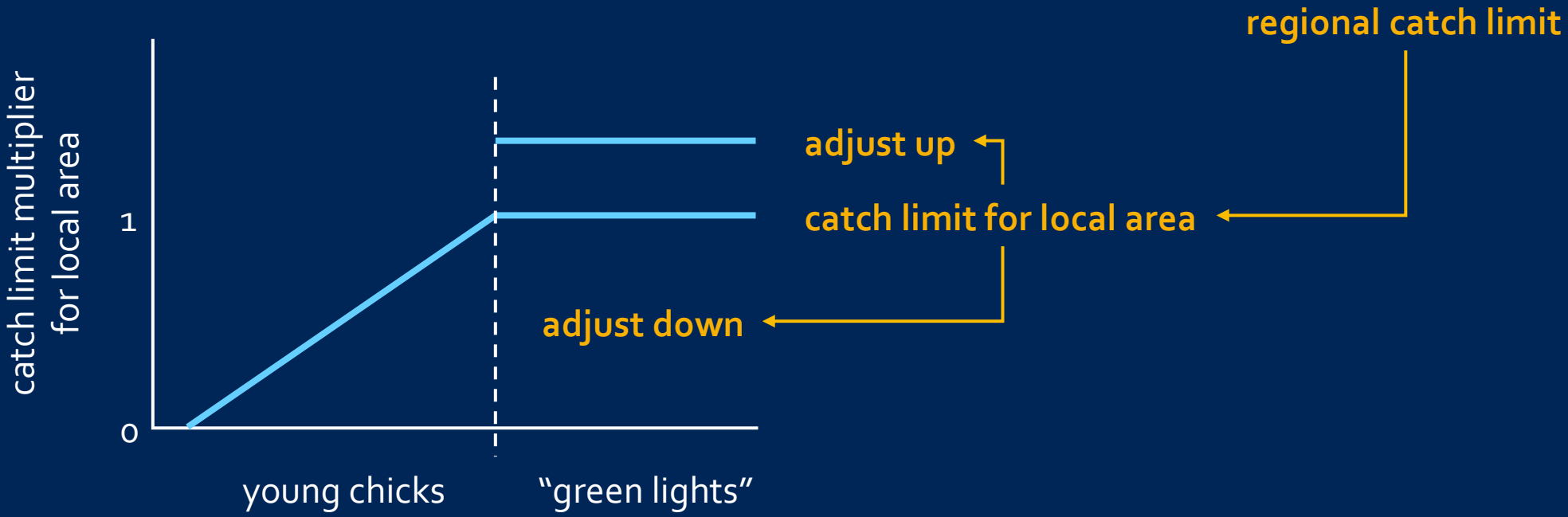
AERD's FBM concept contd.



≥ 1 decision rule per local area

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Key features

- Synthesis of multiple data sets
- Adaptive to climate change, growing whale populations, etc.
- Synergy between ecosystem and single-species approaches
- Tactical decisions based on ecosystem data

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NMFS EBFM Policy and FBM

NMFS Principles*	AERD's Concept
1. Implement ecosystem-level planning	FBM designed to achieve CCAMLR objectives
2. Advance understanding of ecosystem processes	FBM requires ongoing monitoring that is informative about change
3. Prioritize vulnerabilities and risks	FBM based on recognition that concentrated fishing in local areas is risky
4. Explore and address tradeoffs	FBM must be agreed by consensus
5. Incorporate ecosystem considerations into management advice	FBM operationalizes use of ecosystem data in tactical decision making
6. Maintain resilient ecosystems	FBM self-adjusts to change and minimizes management action based on "false positives"

* from draft NMFS Policy Directive on Ecosystem Based Fisheries Management (J. Link)

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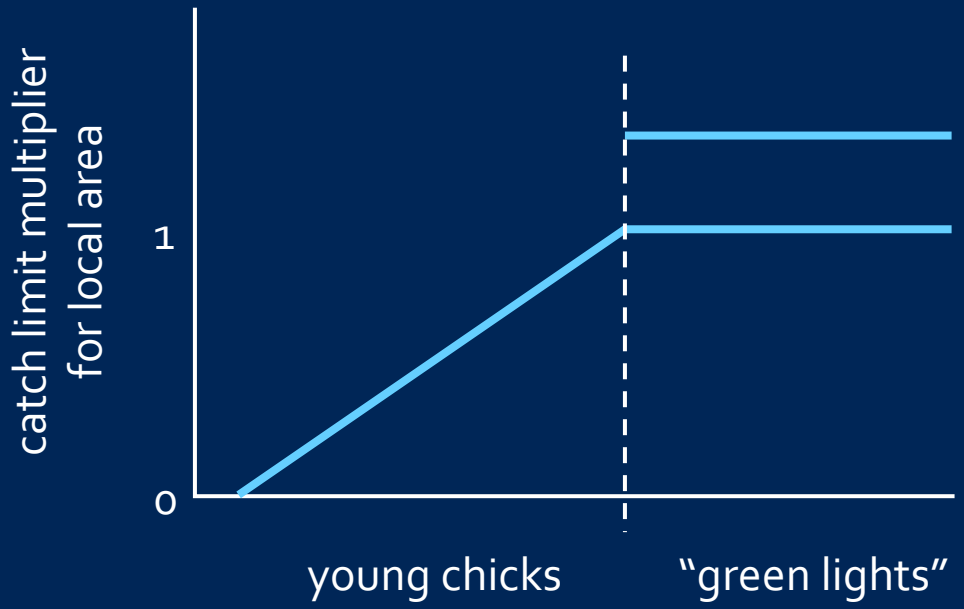

1.6 Wrap up

1.5 Adjust up

1.4 Base catch limit

1.6 Adjust down

1.2 & 1.3 Background

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Answers to TOR questions

1. Ultimate objective is to provide scientific evidence and advice needed to implement EBFM in Southern Ocean
2. AERD priorities are CCAMLR and U.S. Del priorities (current emphasis on management of krill fishery and establishment of MPAs)
7. Peer review through Scientific Committee and its working groups (scientific and political) + more typical review processes
8. Communication through CCAMLR process, stakeholder discussion, publications, outreach, etc.

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STRENGTHS

- AERD staff is cross-trained, adaptable, and super invested
- AERD data sets rock
- AERD has strong partnerships
- AERD pushes CCAMLR forward

CHALLENGES

- Political consensus generally requires scientific consensus
- Scientific review often seems contaminated
- Doing same with less
- Doing different with less
- Expanding our horizons

STRATEGIES

- Focus on empirical evidence
- Be dogged but adapt and revise as needed
- Build capacities of and engage with other Members
- Use technology and build creative models
- Prioritize legal mandate and things others aren't doing
- Share data

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